General Information
PHYS 102 Laboratory

> "The great intellectual division of mankind is not along geographical or racial lines, but between those who understand and practice the experimental method and those who do not understand and do not practice it."
>
> George Sarton (1884-1956)

SCHEDULE - SPRING 2020

Week of	Experiment
Jan. 13	None; First week of classes
Jan. 20	None
Jan. 27	Electrostatic Phenomena
Feb. 3	Electric Field Mapping
Feb. 10	None; Spring Recess
Feb. 17	None
Feb. 24	Circuit and Resistivity
Mar. 2	None
Mar. 9	RC Circuits
Mar. 16	None; Spring Break
Mar. 23	Deflection of Electrons
Mar. 30	None
Apr. 6	Ampere's Law
Apr. 13	Electromagnetic Induction
Apr. 20	RLC Circuits; Last week of classes
Apr. 27-28	Make-up period, two days only (special sign-up)

LABORATORY OBJECTIVES

The laboratory work associated with Physics 102 has two principal goals: To give you hands-on experience with the phenomena and models you will study in class; to develop basic experimental and analytic skills that will be used throughout your career in the sciences or engineering.

The laboratory exercises that you will do here are not "experiments", in the sense of forays into the unknown designed and executed by an intrepid young scientist (you). Rather, they were chosen to illustrate physical phenomena, ingenious techniques or useful methods. They

were not intended to be extremely precise, and your results will be far from exact. You will be evaluated on your understanding of the material and your approach to problems, not merely the precision of your results, and you should allocate your effort accordingly.

As one of the earliest laboratory courses in your career at Rice, PHYS 102 will emphasize very basic skills. You should develop the ability to:

1. carry out common laboratory procedures correctly and safely;
2. make measurements and report your results in physically meaningful form, including estimates of uncertainties where appropriate;
3. recognize when equipment or procedures are not working, and undertake logical corrective action.

You will also have the opportunity to communicate your results in the form of short reports on each experiment. To see how these goals fit into the overall laboratory program at Rice, you can consult the overview of laboratory objectives at http://www.owlnet.rice.edu/~labgroup/.

LABORATORY ORGANIZATION

Your laboratory session will meet for three hours each week that an experiment is scheduled. You will not be able to attend a lab session if you are more than 15 minutes late. During the first week of class, you will have to sign-up for a lab session period using the lab preference form on Owl-space. In the lab, you and your partner will use the time to collect and analyze the data for the experiment, and to each prepare a brief report of your results.

Attendance at the laboratory session is mandatory. If you must miss your regular session for any reason there are two options:

a) You may attend another session during the week, with permission from the instructor in charge of the "host" section. Permission will not be granted if the section is full. The rule for getting into a “host” section is basically "first come, first serve." Upon arriving at the lab room at the beginning of the lab section that you intend to join, you will write your name on the sign-in list on the blackboard at the front of the lab room to request a spot. The students who are enrolled in the lab section have priority over students who are not enrolled in the lab session. You cannot reserve a spot ahead of time. Note that if you attend a lab session as a “guest”, the grade of your lab report will be assigned by the instructor in charge of the “host” section, not your regular lab instructor.

b) You may attend the make-up sessions after the last week of labs. Note that you will not be allowed to make up more than one experiment this way. If you missed more than one lab during the semester, then you can only make-up one of the labs that you missed **regardless of the reason** for why you missed any of the labs. A sign-up sheet will be provided during the last week of labs for you to schedule your attendance. The sign-up

sheet will be in Herzstein Hall, Room 207 during the lab meeting times. The make-up will meet from 2pm to 5 pm in Herzstein Hall, Room 207, on April 27nd and April 28th.

DATA TAKING

It will be difficult to complete a lab if you have not read over the experiment before class. As you read, try to "think through" the experiment in order to decide what quantities you will vary, how the data should be plotted, and what you think the results should be. You may also want to lay out the data tables you think you will need, and make note of useful formulae. Remember to bring a calculator to class.

Once the apparatus is set up, you can start taking data. You and your partner will often need to work together to get the data and record it efficiently. In any case, you should both try all phases of the experiment, rather than becoming specialists. If at all possible, make a plot of the data as you go along. Your graph will very quickly tell you if the data are reasonable, if the parameters are being varied enough, and if the apparatus is working.

The apparatus you are using, although relatively simple, is remarkably expensive. Please be gentle so that neither you nor the apparatus is damaged. Particularly delicate or hazardous operations are noted in the lab manual as they occur. Please heed the warnings. If a piece of equipment does malfunction, please tell the instructor so it can be tagged for repair. We usually have a spare with which you can finish the lab.

REPORTS

A template will be provided for each exercise. Record the data as indicated, attach supporting plots, and answer the questions posed.

The laboratory assistants have been instructed to collect all reports at the end of the lab session. Only one report from each group will be graded although a report from every student will be collected. It is important that everyone in your group understands the experiment and submits a competent report. Your grade may be dependent on the contents of your group partners' report. Also, it is important that every report from the group contains the name of every student in the group. Your report will be returned to you at the next regular meeting with your group's grade.

GRADES

The lab grade is based on performance during lab sessions and quality of the lab reports. The resulting score will be reported to the lecturer as your grade for the laboratory portion of PHYS 102. The lab grade accounts for 15% of a student's total grade for PHYS 102. However, if a student's total lab grade fells below 50%, then the student will automatically fail the entire

PHYS 102 course. To ensure that no student is penalized or given an advantage for having a TA that is overly harsh in grading or overly easy, the final lab grades are normalized so that the average lab grade of each lab session is equal to the average grade of the entire class. This way all students' final grades are assigned based on the same scale.

Grading is a necessary evil but you should be aware that most students do reasonable work and get good scores. A good grade is not, therefore, the most valuable thing you can get from this course.